Introduction

Pyrrolidine-2-carboxylic acid, commonly known as L-Proline (I), has shown, in recent times, excellent catalytic activity, in catalyzing a wide variety of reactions such as aldol,1,2 Mannich,3–5,10–12 Michael,6–9 in a highly enantioselective manner. These reactions have produced a variety of useful chiral materials for organic synthesis.

Most of the L-Proline (I) catalyzed reactions are believed to involve enamine (II) as key intermediate in its catalytic cycle (Scheme 1).

Abstracts

L-Proline (I) catalyzes the asymmetric aldol reaction between acetone and various aldehydes. In the case of hydroxy acetone, it gives anti-diols in excellent diastereo- and enantioselectivities.1,2

L-Proline catalyzes the Michael reaction of ketones with nitro olefins to provide a variety of chiral Michael addition products.6–9
l-Proline catalyzes asymmetric the three component coupling involving Mannich reaction of acetone aldehydes and aryl amines to give β-amino ketones. In case of hydroxyacetone it gives α-hydroxy β-amino ketones in good to excellent ee. This reaction complements the Sharpless asymmetric aminohydroxylation.3–5,10

l-Proline catalyzes Mannich type reaction of protected α-imino ethyl glyoxylate with a variety of ketones to provide functionalized α-amino acids in high enantioselectivities.11,12

l-Proline catalyzes α-amination of ketones by applying azodicarboxylate as nitrogen source to give chiral α-hydrazino, α-amino ketones, and alcohols.13

Recently, 1 has proved to be the best catalyst for asymmetric Robinson annulation.5

References